

Test Notes

factor by grouping

- break problem into two ^{pieces} ~~chunks~~ & see what divides out of each one

ex $8r^3 - 64r^2 + r - 8$
 $8r^2(r-8) + 1(r-8)$

only 1 in common

$(8r^2+1)(r-8)$
 front pieces matching


* always check, have you factored completely?
roots → factor → eq.

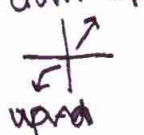
- if given a root (ex. $x=8$) the factor would be $x-8$
 or ex. root is -5 , the factor would be $x+5$
- write all the factors in, plug in a point & solve for a
- * given a graph, similar idea only you look at the zeros then change them into factors, plug in a point & solve for a.

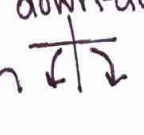
The general formula for factored form is...


$$f(x) = a(x-p)(x-q)(x-r)(x-w) \dots$$

end behavior




LC +
D even  up-up

LC +
D odd  down-up

LC -
D even  down-down

LC -
D odd  up-down

roots/zeros from multiplicity

- if the degree is 1 then it's a single root  ex. $(x-3)^1$
- if the degree is 2 then it's a double root (bounces)  ex. $(x-3)^2$
- if the degree is 3 then it's a switchback root  ex. $(x-3)^3$

Vocab

- leading coefficient (LC) is the # attached to the highest degree
- degree (D) is the biggest exponent
 - * given factored form, you add the exponents together

examples

1. $-9x^3 + 10x^2 - 14x^5 + 9 \rightarrow$ LC: -14
D: 5

2. $4(x-1)^2(x+3)(3x-5)(x+6)^3 \rightarrow$ LC: 12 (all #s with x)
D: 7 (add exponents)

dividing

- focus on front terms
- remainder is written $R/\text{divisor}$

if the remainder is zero then it's a factor

don't forget place holders

ex

$$(3x^3 - 5x^2 + 10x - 3) \div (3x + 1) = x^2 - 2x + 4 - \frac{7}{3x+1}$$

$$\begin{array}{r} 3x+1 \overline{) 3x^3 - 5x^2 + 10x - 3} \\ \underline{- 3x^3 + x^2} \\ -6x^2 + 10x \\ \underline{- 6x^2 - 2x} \\ -12x - 3 \\ \underline{- 12x + 4} \\ -7 \end{array}$$

① what times $3x$ gives me $3x^3$?
 $\rightarrow x^2$ goes on top

② multiply x^2 by the outside piece ($3x+1$)

③ ~~is~~ put in a subtraction sign

④ ~~is~~ drop down the next term

$3x+1$ is not a factor because there's a remainder

fractions

- adding/subtracting find common denominator then combine the top
- multiplying you multiply straight across
- divide, flip the second fraction & multiply

Binomial Expansion

use pascal's Δ to get coefficients \longrightarrow

ID your a & b values, one exponent goes largest to 0 & one goes 0 to largest

					rows	
	1				0	
	1	1			1	
	1	2	1		2	
	1	3	3	1	3	
	1	4	6	4	4	
	1	5	10	10	5	5

ex $(a+b)^3 = 1a^3 + 3a^2b + 3ab^2 + 1b^3$

a goes 3 \longrightarrow 0

b goes 0 \longrightarrow 3

use row 3 for the coefficients

examples

1. $(x+3)^3 = 1x^3 + 3x^2(3) + 3(x)(3)^2 + 1(3)^3$

$= x^3 + 9x^2 + 27x + 81$

$a = x$
 $b = 3$
row 3 (1, 3, 3, 1)

2. $(2x+1)^4 = (2x)^4 + 4(2x)^3(1) + 6(2x)^2(1)^2 + 4(2x)(1)^3 + 1(1)^4$

$= 16x^4 + 32x^3 + 24x^2 + 8x + 1$

$a = 2x$
 $b = 1$
row 4 (1, 4, 6, 4, 1)